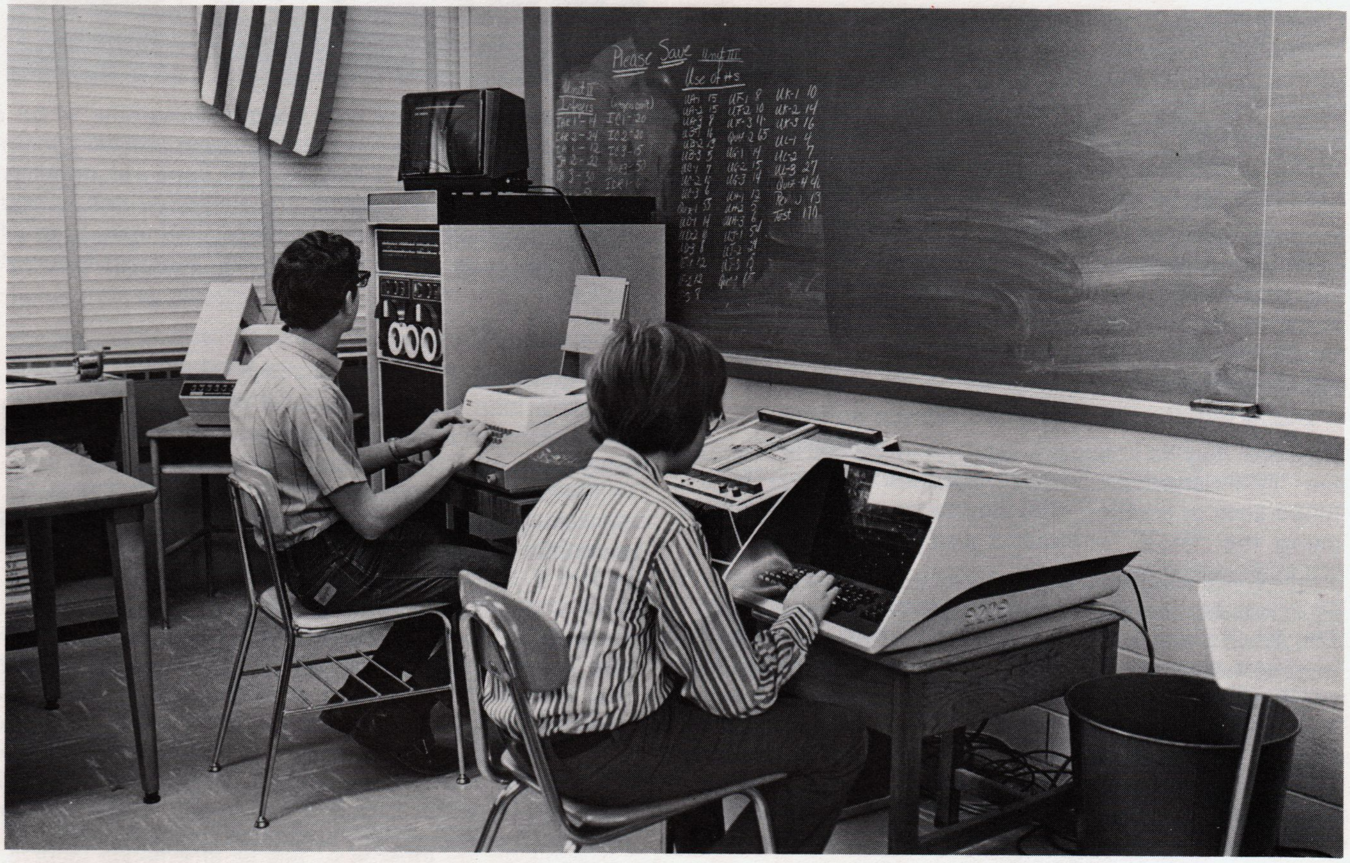
DIGITAL EQUIPMENT CORPORATION

education

EDUSYSTEM 25



EDUSYSTEM 25

EduSystem 25 is a complete self-contained time-sharing system for up to 8 users using the BASIC language. Unlike smaller core resident multi-user systems, EduSystem 25 BASIC offers program storage, data file storage, alphanumeric strings, program chaining and numerous language extensions to Dartmouth standard BASIC.

EduSystem 25 also allows four users to run using the FOCAL language, though not simultaneously with BASIC. In addition, in stand-alone mode (1 user), the system runs FORTRAN, assembly language and the utility programs of OS/8, the Operating System for the PDP-8.

DIGITAL EQUIPMENT CORPORATION

It is no accident that the best line of school computer systems is also the least expensive. EduSystems are built by Digital Equipment Corporation, the world's leading manufacturer of small computers. Digital invented the small computer and pioneered its development. Installations now number more than 15,000.

This combination of unmatched volume and engineering experience makes DEC the price-performance leader in small computers. But there is more. DEC also has unmatched experience in the field of school computers. In secondary schools alone, our computers have been in schools since 1965. Our college and university experience goes back even farther. EduSystem 25 and the entire line of low-cost EduSystems are the direct result of this vast classroom experience.

computers are for kids — digital — EduSystems—expandable, economical

SOFTWARE

DARTMOUTH STANDARD BASIC

EduSystem 25 BASIC is a full implementation of BASIC as developed at Dartmouth College. In addition EduSystem 25 BASIC has program storage, data file storage, character strings, program chaining, additional functions, multiple statements per line, editing and an extensive set of over 50 error diagnostics.

PROGRAM STORAGE

Using EduSystem 25 BASIC, programs may be stored temporarily or permanently on magnetic tape. Programs can be stored at any time using the “SAVE” command. Using the “OLD” command with the program name allows retrieval of the stored program from DECtape in a matter of seconds. And when a program is no longer needed, it can be deleted with the “UNSAVE” command.

Program storage on DECtape is a substantial improvement over conventional paper tape. No more tape tearing because DECtape is durable mylar. DECtape is easy to handle (4″ diameter reels), easy to store, and fast (it would take half a day to read a DECtape worth of programs from paper tape).

DATA FILE STORAGE

Data files may be created in EduSystem 25 BASIC using the “PUT” statement. “GET” retrieves the data at a future time. In addition, files may be opened and named using the “FILE” command and closed using the “CLOSE” command.

Data files are the perfect way to test student programs. The teacher may create a data file which all student programs must use and then answers may be stored in another file which may be checked automatically.

CHARACTER STRINGS

Alphanumeric string processing allows strings of characters to be input, manipulated, compared and output using INPUT, LET, IF and PRINT. For example:

```
10 PRINT “DO YOU WANT TO LEARN
   ABOUT STRINGS?”
20 INPUT A$
30 IF A$=“YES” THEN 50
40 IF A$=“NO” THEN 90
   — — —
```

PROGRAM CHAINING

EduSystem 25 permits core resident programs to be a maximum of 250 lines long. But by using program chaining, programs can be as long as a DECtape—an unbelievable 10,000 lines! Programs are simply written in segments, connected by the “CHAIN” command, which starts execution of the next program segment automatically.

MULTIPLE STATEMENTS PER LINE

With EduSystem 25 BASIC (or FOCAL), bigger programs can be written in a given amount of core, without chaining, by using several statements on a line. For example, a program to print a table of square roots would be:

```
10 FOR N=1 TO 100\PRINT N, SQR (N)\NEXT N\END
```

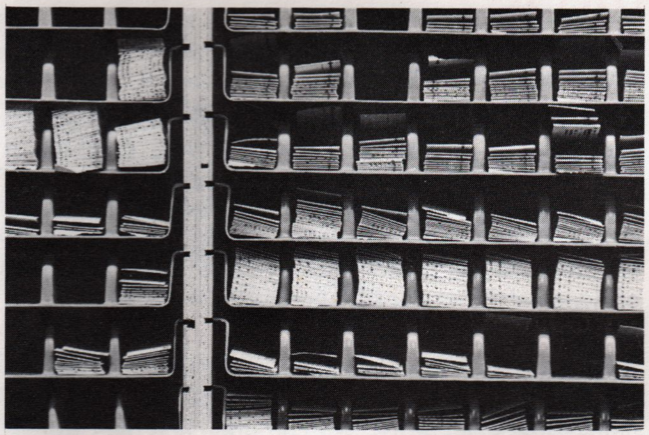
So more program can be run on EduSystem 25 without more core memory.

EDITING

Frequently it is only necessary to correct several characters in a line. Rather than retype the entire line, which may be a complex formula or output format, the EDIT command allows the user to access a single line and search for character(s) to be changed. Characters or portions of a line may be deleted, inserted, or changed. Also, by use of the “DELETE” command, entire lines or portions of a program may be deleted en masse.

BASIC STATEMENT SUMMARY

Statements		**Functions**	**Commands**
LET	GOTO	+,−,x,/,↑	LIST
DEF	IF-THEN	SIN (X)	RUN
DIM	IF-GOTO	COS (X)	NEW
READ	FOR-TO	TAN (X)	OLD
DATA	FOR-TO-STEP	ATN (X)	SAVE
RESTORE	NEXT	EXP (X)	UNSAVE
INPUT	ON-GOTO	LOG (X)	CATALOG
FILE	GOSUB	SQR (X)	EDIT
GET	RETURN	ABS (X)	DELETE
PUT	CHAIN	INT (X)	KEY
CLOSE	STOP	FIX (X)	TAPE
PRINT	END	SGN (X)	SCRATCH
REMARK		RND (X)	BYE
RANDOMIZE		TAB (X)	Control/C



FOCAL

Digital Equipment Corporation's own conversation language designed especially to put the power of the PDP8 in the hands of a user is called FOCAL. The FOCAL language is conversational, meaning the computer responds immediately to typing at the terminal. In that sense, it is like BASIC.

FOCAL commands, while easy to learn and use, are very powerful, particularly the IF, FOR and DO subroutine commands. In this respect, FOCAL is like FORTRAN.

FOCAL is an ideal comparative language to BASIC and is an excellent stepping stone to FORTRAN. EduSystem 25 runs FOCAL on up to *four* terminals (known as QUAD FOCAL), but not simultaneously with BASIC. It also runs an extremely powerful extended version of FOCAL on one stand-alone terminal. This is known as OS/8 FOCAL. Three FOCAL textbooks are included in the EduSystem 25 Textbook kit. For more information on FOCAL, see the handbook, "Programming Languages."

FORTRAN

Under the OS/8 operating system, EduSystem 25 supports FORTRAN (an acronym for FORmula TRANSlation) for one user. FORTRAN enables a programmer to express his problem using English words and mathematical statements similar to algebra yet acceptable to the computer. FORTRAN is one of the oldest and most widely used computer languages in the world for scientific calculations. For more information on FORTRAN, see the handbook, "Programming Languages."

ASSEMBLY LANGUAGE

An absolute necessity for the advanced study of computer science is the availability of a relocatable assembly language (machine language) which can be compiled and run easily. Under the OS/8 operating system, EduSystem 25 offers SABR (Symbolic Assembler for Binary Relocatable programs), an advanced one-pass assembler producing relocatable binary code with automatically generated core page and memory field linkages. It supports an extensive list of pseudo-operators which provide, among other facilities, external subroutine calling with argument passing and conditional assembly.

From a user's standpoint, SABR is similar to the PAL-III assembler which produces location-dependent (non-relocatable) binary coding. The textbook kit with EduSystem 25 includes a step-by-step self-teaching manual on the PAL-III language. For more information, see the DEC handbooks, "Introduction to Programming" and "Programming Languages."

EDUCATION SOFTWARE KIT

The education software package is what makes your EduSystem a complete tool for student instruction, not just a computer. It includes software, textbooks, curriculum materials and guides for the use of the computer in the classroom. Many of these materials were developed by Digital Equipment Corporation and its users. The rest were assembled in cooperation with leading textbook publishers. Together, they provide your school with the tools to integrate your EduSystem into the classroom quickly and effectively.

Included with EduSystem 25 are:

3	Programming Texts
12	Computer Mathematics Texts
1	Set of Computer Math Problems
4	Computer Science Texts
11	Volumes of Programs in biology, chemistry, earth science, physics, social studies, math and teacher assistance.
23	Overhead Projector Transparencies to teach BASIC.

DIGITAL EQUIPMENT COMPUTER USERS SOCIETY

The education software package contains many, but by no means all, of the programs and techniques developed by present EduSystem users. As more and more schools acquire EduSystems, the amount of material can only increase. To insure a means for a free interchange of these materials among users, Digital supports a user's society, DECUS. Free membership in DECUS goes along with the purchase of any EduSystem. Members may submit any programs which they feel are of general interest. These programs are then available to other users free of charge. The Education Software index lists some 300 programs available from DECUS specifically of interest to schools.

DECUS also sponsors special interest groups including one in education and holds three conventions each year.

TRAINING

Complete educational and technical backup is offered as part of overall system support. Field service and software support personnel are available during installation to assist you in learning the system operation.

EduSystem 25 also includes at no extra charge three weeks of training in Maynard, Massachusetts, Palo Alto, California or any one of DEC's worldwide training facilities. The course includes instruction in the various EduSystem 25 programming languages and includes hands-on experience.

HARDWARE

CENTRAL PROCESSING UNIT

The heart of EduSystem 25 is a PDP8/E computer. First and foremost, PDP8/E is the most popular minicomputer in the world. Over 15,000 are in use today; more than all of the others combined! It's popular for some good reasons.

A unique feature of the PDP8/E is the OMNIBUS slot independent concept. Memory, peripherals, controllers, etc. can plug into any slot in the OMNIBUS. This means easy expansion and alternative configurations as your needs grow and change.

The PDP8/E is reliable. The PDP8/E is UL approved. On the test line PDP8/E computers are shaken, baked, frozen and dropped. A system exerciser runs *each and every* system including all peripherals before it leaves the plant. Calculated mean time between failure (MTBF) is 8050 hours—a figure verified by actual field performance.

The PDP8/E is up to date. It won't be obsolete in a year or two. Purchasers of older PDP8 family computers have seen the peripherals and software for the 8-line expand dramatically over the years. With every new PDP8 sold, this support can only increase.

POWER FAIL DETECT/AUTO RESTART

Adding to the reliability of EduSystem 25 is power fail detection with automatic restarting. In case of a dip in voltage, improper shutdown of the system or accidental removal of the power plug, the system recovers automatically and resumes operation when power is restored. No loss of program or vital data.

AUTOMATIC BOOTSTRAP LOADER

No complicated 10 or 15-step loading of the system software with EduSystem 25. The hardware bootstrap loader takes care of that. Here's the entire loading procedure:

1. Set Switch Register to 0600
   Press "SW"

and you're off and running.

DECTAPE

EduSystem 25 comes complete with a dual DECtape drive and controller. DECtape is virtually indestructible ¾" magnetic tape on pocketsize 4" reels. Unlike tape cassettes, DECtape may be randomly referenced at any point in the reel, it may be read or written in either direction and each 4" reel holds 370,000 characters of information. That's equivalent to 5 boxes of tab cards with 40 columns of information punched into every card. Yet the entire tape can be read into the computer in less than 1 minute.

DECtape is so reliable that it's used in virtually hundreds of hospitals and clinical laboratories where the occurence of an error is intolerable. And DECtape is reliable under adverse conditions: It's used in grimy, dusty newspaper composition rooms all over the world. Most leading numerical control milling machine manufacturers use DECtape in their systems. So do hundreds of industrial plants, banks, laboratories and schools.

DECWRITER

Combining solid state reliability with high (30 characters per second) print speed, quiet operation, and economy—that's DECwriter. With program and data storage on DECtape, it's no longer necessary to have the teletype paper tape reader and punch for program storage. Hence, the DECwriter, operating at three times the speed of a teletype, is the logical choice for one or more terminals on EduSystem 25. Any place the requirement is for speed, quietness, or extra dependability—that's where a DECwriter should be specified.

DECTERMINAL

The DECterminal is an alphanumeric CRT terminal which is absolutely noiseless, fast (30 cps), reliable and economical. It uses large, easy-to-read characters (72 characters per line, 20 lines displayed) and it drives up to 12 standard television monitors.

How many times have you seen students clustered around a teletype trying to see what was going on? Not a very effective way to teach. But with a VT05 DECterminal driving standard TV monitors (Conrac, Sylvania, Sony, etc.) the whole class can see.

PLOTTERS, OTHER TERMINALS

EduSystem 25 supports most of the standard teletype-compatable plotters on the market. Plotters open up the world of coordinate geometry, non-determinant algebra, and computer art. Support routines in BASIC are available from DEC for the Time Shared Peripherals TSP-212 and the Omega-T Fasplot plotters.

EduSystem 25 also supports the Tektronix 4010 graphics display terminal for plotting and computerized design in the interactive mode.

TELETYPE

Workhorse of the computer and communications world, the ASR-33 Teletype is the "standard" terminal of EduSystem 25. The Teletype operates at 10 characters per second. It has a built-in paper tape reader and punch for saving and reusing programs from individual terminals. The Teletype is the lowest cost choice for a terminal to EduSystem 25.

REMOTE TERMINALS

"Hardwired" terminals may be located up to 1500 feet away from the central processing unit. However, EduSystem 25 may also be used over standard voice-grade telephone lines (up to 7 terminals—all but the console) using standard Bell 103A modems or equivalent at the computer end.

At the remote site, all that is needed is a telephone and any one of the above terminals equipped with an acoustic coupler.

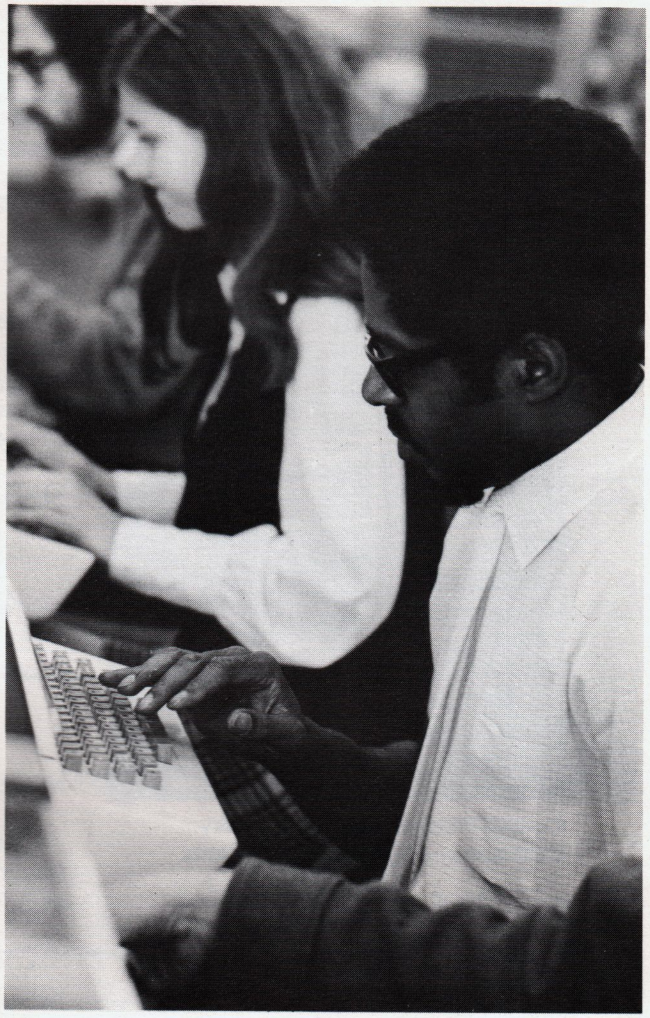
EXPANSION

Key to the EduSystem concept is the ability of systems to expand and change as needs grow and broaden. If you now have an EduSystem 20, it can grow to an EduSystem 25 with the addition of 4K of memory (12K total) and dual DECtape.

EduSystem 25 grows to EduSystem 40 with the addition of an optical card reader. And EduSystem 50 is just an RF/RS08 262K disk away.

MAINTENANCE

Maintenance for EduSystem 25 may be purchased by contract or "on call." Service and parts are backed up by an extensive world-wide network of branch, district and regional service centers. Over 1000 field service engineers in 126 locations stand ready to keep your EduSystem 25 running with minimal downtime.



ENVIRONMENTAL REQUIREMENTS

No formal computer room or air conditioning is required for EduSystem 25. Extremes of temperature (above 85° F, below 70° F) and extremes of humidity (above 90%, below 10%) and very dusty environments should be avoided.

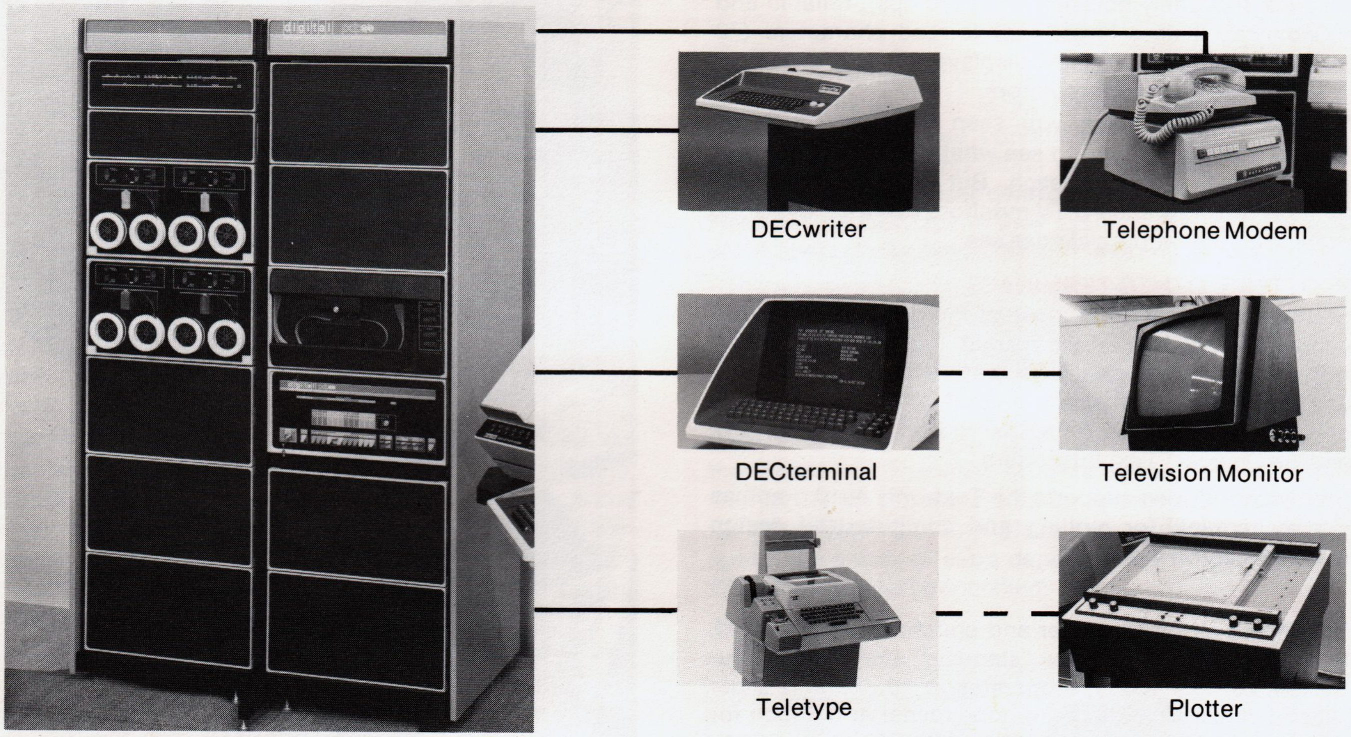
The basic computer system draws 16 amperes at 115 volts. A 30 ampere circuit is recommended. It has a 3-prong Hubbell No. 3331 male power connector which mates with a No. 3330 receptacle. The connector may be converted to two standard grounded 3-prong plugs. Power cable length is 15 feet. Each terminal is equipped with an 8 foot cable (terminal to computer) and an 8 foot power cable terminating in a standard 3-prong 115 volt grounded plug. Terminals draw 2.0 amperes each.

The computer system occupies an area 44″ wide x 25″ deep and is 75″ high. It requires at least 18″ in the rear for service access and 12″ on each side for air circulation. The system weighs approximately 460 pounds. Each terminal is 22″ wide x 19″ deep and weighs 70 pounds.

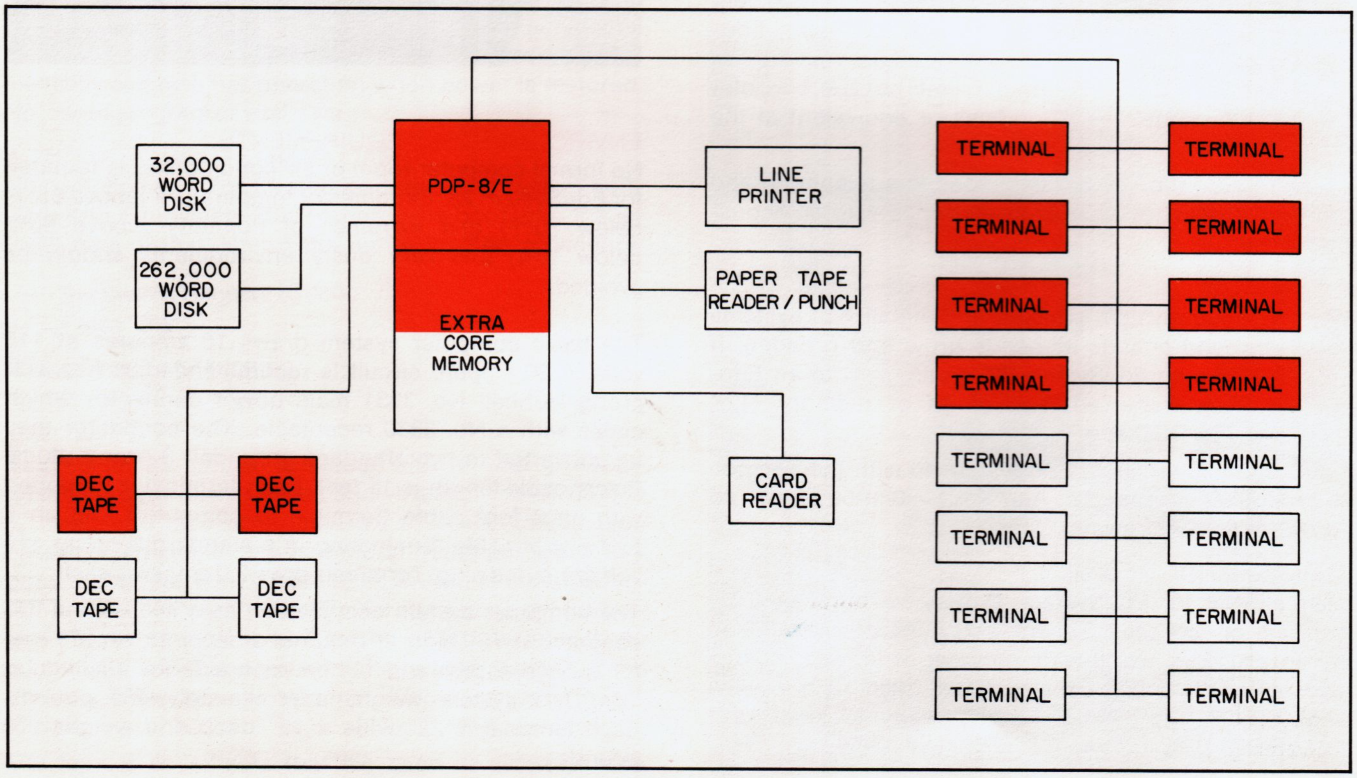
EDUSYSTEM 25 CONFIGURATION CHART

BASIC COMPUTER SYSTEM

ANY COMBINATION OF TERMINALS (UP TO 8)



Central Processing Unit, Memory, DECtape and System Components



CONFIGURATION CHART

Quantity	Number	Description	Price	Mo. Lease	Mo. Maint.
BASIC SYSTEM					
1	PDP8/E-CA	Computer, 4K Memory	$ 5,640		50
1	MC8-E	First add'l 4K Memory	2,750		20
1	MM8-E	Add'l 4K Memory	2,500		20
1	KP8-E	Power Fail/Restart	250		2
1	MI8-EF	Edu Bootstrap	500		5
1	TC08	DECtape Control	4,500		20
1	TU56	Dual DECtape Drive	4,700		30
1	KD8-E	Data Break Interface	500		3
1	KA8-E	Positive Bus Interface	250		3
1	LT33-DC	Console Teletype	1,500		30
1	EDU8-B25	System Software	250		—
1	LIBKIT-S8-OS8DA	OS/8 Software	300		—
1	EDU8-A	Textbook kit	100		—
		SYSTEM TOTAL	$23,740	$523	$183
TERMINALS (4-USER SYSTEM)					
3	KL8-E	TTY Interface	900		15
3	LT33-DC	Teletype	4,500		90
		4-USER SYSTEM TOTAL	$29,140	$642	$288
TERMINALS, ETC. (8-USER SYSTEM)					
1	MM8-E	Add'l 4K Memory	2,500		20
1	BE8-A	Expander Box	N/C		—
4	KL8-E	TTY Interface	1,200		20
4	LT33-DC	Teletype	6,000		120
		8-USER SYSTEM TOTAL	$38,840	$855	$448
DECWRITER TERMINAL*					
1	LC8-E	LA30 Interface	300		6
1	LA30-PA	DECwriter Terminal	2,795		30
		DECwriter TOTAL	$ 3,095	$ 68	$ 36
ALPHANUMERIC DECTERMINAL*					
1	KL8-EC	VT05 Interface	350		5
1	VT05	DECterminal	2,795		35
1	H308	Null Modem	60		—
		DECterminal TOTAL	$ 3,205	$ 71	$ 40
REMOTE TERMINAL*					
1	KL8-EA	Remote TTY Interface	$ 350	$ 8	$ 5

Also requires Bell 103A Modem available from Bell Telephone Company and Teletype with acoustic coupler (EDT 33 ASR) available from Western Union Service Company—Phone (800) 631-7050—$65/mo including maintenance.

*Alternative terminals may be substituted for local teletype terminals shown in 4- and 8-user systems above.

digital

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